CENTER FOR THE STUDY OF RURAL AMERICA
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The Rise of Ethanol in Rural America

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Ethanol could suddenly become the gasoline additive of choice in America. As policymakers debate the future path of U.S. energy policy, they face added concerns for public safety and America's growing dependence on foreign oil. The outcome of these debates could spell the end for MTBE (methyl tertiary butyl ether) as a fuel additive—and have important implications for the future of the ethanol industry in rural America.

Because ethanol is produced mainly from corn, an expanding ethanol industry would give an economic lift to many farmers. New ethanol plants would also create jobs, raise incomes, increase tax revenues, and offer new investment opportunities to some rural communities. Whether rural America will tap these economic benefits depends on two factors—the future course of public policy and the nation's willingness to pay for renewable fuels.

Why is the nation turning to ethanol?

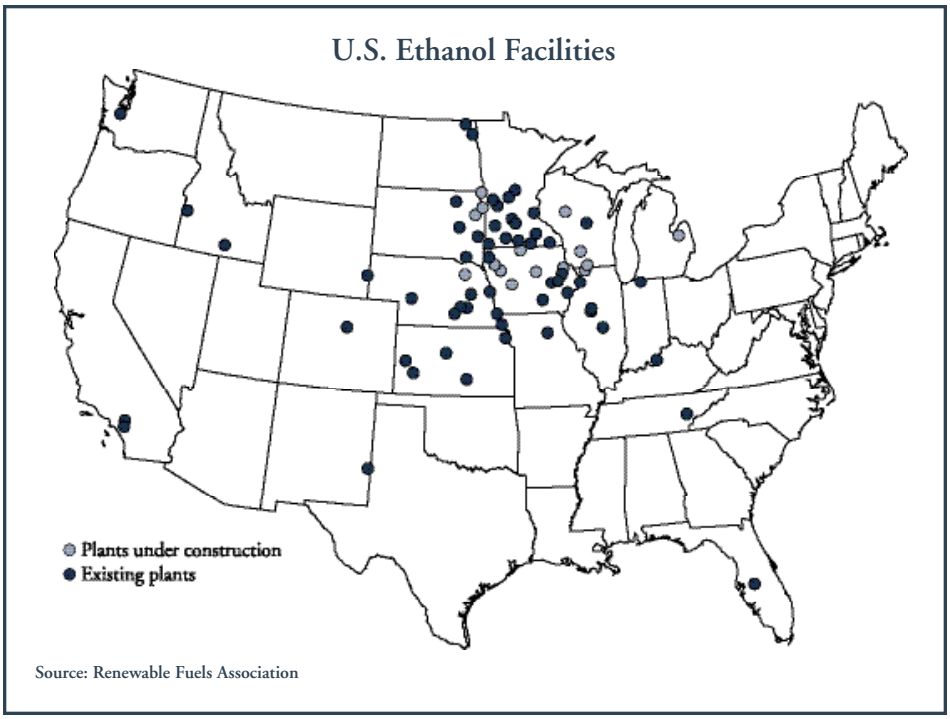
Ethanol is a fuel made from plants such as corn. It is more expensive to produce than petroleum-based fuel but has the advantages of burning cleaner while boosting octane levels. Its environmental attribute has placed it squarely in the middle of ongoing national policy debates on environmental and energy policies.

By mandating clean burning fuels and providing subsidies to ethanol producers, policymakers are reshaping the ethanol industry. Public policy will remain the key to ethanol's future as a new national energy policy moves through Congress with a focus on energy independence.

Amendments to the Clean Air Act in 1990 opened the door for increased ethanol use. The new laws required refiners to formulate gasoline with higher oxygen levels. Oxygen helps gasoline burn cleaner and thus reduces harmful emissions. The so-called oxygenate standards were first imposed in the Winter Oxyfuels Program, and the standards were then extended in the year-round Reformulated Gasoline Program. The Winter Oxyfuels Program was implemented in 1992 and required gasoline to contain 2.7 percent oxygen by weight during the winter months in cities with high carbon monoxide pollution. The Reformulated Gasoline Program began in 1995 and required specially blended gasoline containing 2 percent oxygen in cities that significantly exceeded federal ozone standards.

Because regular gasoline does not contain oxygen, additives must be used to meet federal standards. The energy industry turned to two oxygen-rich additives, MTBE and ethanol. These additives also serve as octane enhancers which boosts the grade of conventional gasoline, thus commanding a higher price.

Petroleum-based MTBE became the energy industry's first choice, even though ethanol contains twice as much oxygen per gallon. MTBE is easily blended with gasoline and can be transported via pipelines, creating fewer problems for refiners.



Ethanol has not been shipped via pipelines because the pipelines contain moisture and other deposits that can be absorbed by ethanol and thus alter its state during transport. So far, the volume of ethanol-blended gasoline has not been large enough to warrant the required adjustments to pipelines to rid them of the deposits.

Ethanol is also more expensive than MTBE. Because ethanol is not shipped via pipelines, it must be blended at the terminal which requires separate storage tanks for the gasoline and ethanol and special blending systems. These added transportation and blending costs have discouraged the use of ethanol in many markets.

Still, several factors have kept ethanol competitive with MTBE. The biggest of these has been an exemption from a portion of the federal excise tax on gasoline containing ethanol. This tax break amounts to 5.3 cents per gallon of gasoline containing 10 percent ethanol. Some states, mostly in the Midwest, provide additional fuel tax incentives. Moreover, since ethanol contains almost twice as much oxygen as MTBE, roughly half as much is required to meet oxygen standards.

While MTBE became the most widely used fuel additive, significant concerns over its safety began to surface in the mid-1990s. Studies have shown that when MTBE spills, it can enter the water supply because it does not bind well with soil. At certain concentrations, drinking water contaminated with MTBE has a foul taste or odor, making it unfit for human consumption. MTBE has also been listed as a possible carcinogen for humans.

As a result of these findings, several states have banned MTBE as a fuel additive. The most significant ban has been in California where most of the gasoline must have oxygen additives, making the state a huge market for MTBE. The California ban takes effect January 1, 2004, and has left the state looking for alternatives to MTBE to meet minimum oxygen requirements.

California and other states are looking to ethanol as a safe alternative to MTBE. Ethanol not only helps reduce carbon monoxide emissions and replaces harmful chemicals in gasoline, but it is also nontoxic—and is even safe for human consumption.

Amendments to the Clean Air Act boosted growth in the ethanol industry, and now bans on MTBE could propel it even

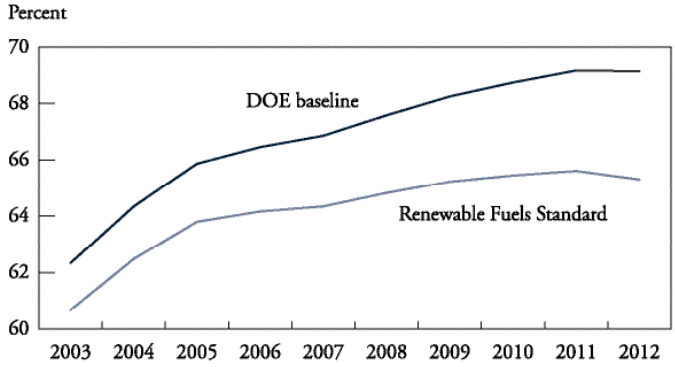
further. In the meantime, policymakers are debating a new national energy policy that could open doors even wider for ethanol. Under proposed legislation, energy policy would eliminate oxygenate standards and instead encourage clean air through the greater use of renewable fuels including ethanol.

Congress appears committed to laws that are environmentally friendly and address energy independence. A proposed Renewable Fuels Standard (RFS) would require a small portion of the U.S. energy supply to be supplied by renewable sources. Ethanol and its soybean-based counterpart, bio-diesel, would both meet this standard for fuel energy. And due to concerns about safety, the legislation would also completely phase out MTBE over the next four to five years. If the new energy policy contains such a standard, the ethanol industry believes demand might accelerate even faster than under the current clean air rules.

Support for an RFS stems not only from environmental concerns about MTBE but also from concerns about the nation's growing reliance on imported oil. Currently, the nation imports nearly 60 percent of its oil. The Energy Information Administration in the Department of Energy projects this number will approach 70 percent by 2012. Many policy officials believe such dependence on imports carries great risk for the nation given the unstable political climate in many major oil producing regions of the world.

Ethanol is a renewable fuel that helps extend the fuel supply—23.8 gallons of ethanol displace one barrel of imported oil. It is easy to see why using more renewable fuels would help decrease the nation's dependence on foreign oil. According to a recent study, an RFS for motor vehicle fuel would have a positive effect on reducing the nation's dependence on foreign oil (Chart 1).

Chart 1
Dependence on Imported Oil
Current Law vs RFS



Sources: U.S. Department of Energy; John Urbanchuk, AUS Consultants

How will increased demand reshape the ethanol industry?

Environmental legislation in the 1990s helped propel an ethanol industry that has grown to a scale of roughly 2 billion gallons produced annually today. Ethanol production and consumption is currently concentrated in the Midwest. An RFS would boost ethanol demand, requiring the industry to expand. The expansion would not only boost prospects for producers but also raise important questions about the future structure of the industry.

Ethanol production is concentrated in the Midwest so that plants can be close to cornfields. In 2001, 1.77 billion gallons of ethanol were produced by almost 60 ethanol facilities across the nation, about 90 percent of which are in midwestern states (map). Triggered by the MTBE ban, ethanol facilities with a capacity totaling roughly 400 million gallons will begin producing this year, and dozens more are in the planning stages. By yearend, ethanol production capacity is expected to exceed 2.7 billion gallons, with nearly 80 percent of this capacity located in Illinois, Iowa, Nebraska, and Minnesota. If Congress sets an RFS, the National Corn Grower's Association projects the ethanol industry to grow to more than 5 billion gallons by 2012 (Chart 2).

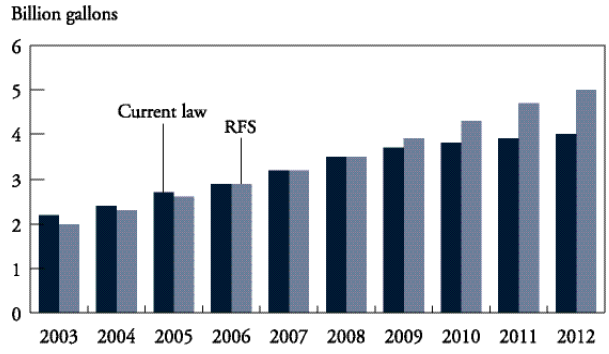
In the short run, this growth will mean more than just new facilities and more production. It will also mean more of the nation's corn crop will be devoted to ethanol production. Corn producers stand to benefit from the expansion for several reasons. First, and most obvious, the price of corn would rise due to increased demand. Ethanol uses about 6.5 percent of the nation's corn crop, adding up to 30 cents to the price of a bushel of corn. In total, ethanol accounts for an estimated $4.5 billion in net farm income. If Congress enacts an RFS, an additional 1.4 billion bushels of corn will be needed over the next ten years.

Ethanol also provides opportunities that transcend higher corn prices for farmers. Farmer-owned cooperatives account for at least half of the new capacity created during the industry's expansion of the last decade. This value-added activity allows producers to benefit from an additional market for their commodity. But it also offers producers the ability to reap the returns from having an ownership interest in processing ethanol. The combination of modest increases in corn prices and returns from ethanol processing will provide an important boost to farm incomes. One industry group concludes that ethanol production adds value for farmers by converting $2 worth of corn into $5–6 worth of ethanol and ethanol co-products.

In the long-run, the ethanol industry will also be reshaped by supply-side factors. Technology will be a major driver in determining the competitiveness of ethanol as a renewable fuel. The industry continues to push for improved technologies. Developing higher value by-products is one area the industry is studying to help reduce net costs of corn ethanol production. And technology is now in progress to produce ethanol from other biomass such as grasses, plant waste, and fast-growing trees. These plants are potentially cheaper sources than corn. Thus, there is potential for ethanol to be much more cost competitive with regular gasoline.

Questions linger over the path the

Chart 2
Ethanol Growth with the RFS



Source: National Corn Growers Association

ethanol expansion will take. Who will own the plants? Will they be small or large? Many plants built recently are small and farmer-owned, helped in part by state and federal incentives. Some industry observers argue, however, that efficiencies can be gained by building fewer, larger plants and capturing economies of size. Larger plants are more likely to be owned by agribusinesses, fueling debate about who benefits from the excise tax exemption. Once again, legislation will play a key role in the future course of the industry.

How does ethanol benefit rural America?

A growing ethanol industry will have economic implications for rural America that reach far beyond higher corn prices. Rural communities could benefit from more jobs, more income, and broader indirect effects when the ethanol industry comes to their town. But questions still swirl around the industry's future structure, and these questions hold important implications for how the benefits will be distributed throughout the countryside.

Even if farmers don't build the ethanol facilities, rural communities have much to gain from having an ethanol plant in their area. Ethanol plants bring jobs to rural areas that often have difficulty attracting businesses and industry. The plants boost employment opportunities for residents. Some relatively high-paying positions provide an incentive for young leaders to stay in their community.

Jobs are just one aspect of the total economic impact ethanol may have on rural America. A wider impact will be felt through all the other jobs and businesses created as a result of the ethanol facility—the so-called multiplier effect. A 1997 report on ethanol's economic impact concluded that the industry added nearly 200,000 jobs to the U.S. economy, a number that has increased in recent years as the industry has expanded. Another study projects that an additional 214,000 jobs will be created throughout the economy over the next decade if an RFS is enacted.

As the ethanol industry creates new jobs, it also creates a larger tax base for local communities. More jobs and additional income ripple through the rest of the economy as money is spent in local businesses. With more money flowing through the economy, more taxes are collected and returned to local and state governments.
A boost to the local tax base is especially important in rural areas where declining populations and economies have made it doubly difficult to support public schools and infrastructure.

While the overall benefits to rural America are clear, it is not clear which communities will benefit. The question of where future plants will locate remains unanswered. There certainly cannot be an ethanol plant to revive every rural community. The industry will likely continue to expand where the corn grows. Longer term, ethanol produced from other types of biomass could result in new plants located near metro centers on the east or west coasts. But in the end, ethanol's future remains highly dependent on public policy—and the value the nation is willing to put on clean air, clean water, and energy generated from renewable sources.

The New Power of Regions
A Policy Focus for Rural America

Evidence is mounting that rural America can seize new economic opportunities by investing in regional competitiveness. Yet U.S. rural policies still focus on individual firms and towns. Why are regional synergies important to the rural economy of the 21st century? How can rural businesses and communities build critical mass through alliances and partnerships? How can public policy encourage these synergies?

This year's conference, held May 9-10 in Kansas City and sponsored by the Center for the Study of Rural America, will help answer these questions. If you are interested in attending, contact Julie Tavener at (816) 881-6864 or Kate Sheaff at (816) 881-2478 by May 6.